SUMMARY

This CMM Science and Technology Development Road Map for DOE-EM is based on a broad and thorough evaluation of DOE-EM characterization, monitoring, and modeling needs. The needs are first and foremost those identified by DOE sites through the formal Site Technology Coordinating Group (STCG) process. Although many of these needs can be met using existing or readily available technologies, numerous gaps (technology development needs) have emerged. DOE-EM OST programs have identified additional strategic needs which will surely arise, even though they may not yet have been expressed by the STCGs. Others have been identified in internal and external studies, such as the National Research Council's *Research Needs in Subsurface Science* and the *DOE Research and Development Portfolio for Environmental Quality*, both published during 2000.

This ***CMM ROAD MAP for DOE-EM*** outlines two major areas, **Waste, Source, and Nuclear Materials Characterization** and **Process and Product Monitoring**, along with three special emphasis areas, **Long-Term Monitoring**, **Nondestructive Methods**, and **Improved Scientific Understandings**. Summary descriptions and brief Vision Statements are given for each, and **Visible and Important Problems** are identified. A discussion of technology development **Strategies** successfully used by DOE-EM in the past to conquer these challenges completes the **INTRODUCTION**.

PROBLEM AND OPPORTUNITY AREA HIGHLIGHTS provides a more comprehensive description of each major and special emphasis area. These areas are collections of Needs Groups, which in turn are collections of specific Needs directed toward specific FAs. The discussion here presents the variety of challenges to be found in each area, along with a summary discussion of past accomplishments and present activities. Goals for future technology development are proposed as well, both **Near-Term Goals** for technology development needed in the next few years to meet pressing site needs and **Far-Term Goals** for science and technology development for which either the need or a reasonable delivery date will be further in the future.

This Part is augmented by **APPENDIX A: PROBLEM AND OPPORTUNITY AREAS**. This consists of a comprehensive breakdown of each area by type of problem, including a comprehensive listing of specific challenges for each. Although many of these challenges are specific to one Critical Application Area, many also are crosscutting challenges shared by several application areas and multiple DOE and other programs. A listing of near-term and far-term goals is given for each area. Moreover, in many cases a technology solution found for one problem will be adaptable for a related problem; the technology development effort expended in one area can be leveraged to provide solutions in another. Finally, lists of CMM Successes and current and recent DOE-EM R&D projects associated with each area are provided.

SOLUTION PATHS complements the **Strategies** section of the **INTRODUCTION** by discussing various routes which have been found successful over the years in recruiting R&D providers and in providing funding and project management to them. Examples are given using the **VIPs**. Further information is provided in **APPENDIX B: SELECTED VISIBLE AND IMPORTANT PROBLEMS**, in which detailed discussions including suggestions for solution strategies are presented. In some cases the solution strategies are more technically explicit, as where a clear path has been identified and development is already underway. In others the solution strategies are more programmatic; in particular, in some cases the nature of the solution or even of the challenge itself has not yet been fully established.

Funding, of course, is a major factor in addressing these technology development needs. A goal of this ***CMM ROAD MAP for DOE-EM*** is to help keep these R&D Goals and the potential benefits to be attained through achieving the goals visible within DOE-EM when priorities are determined and funding decisions made.